

FIG. 1

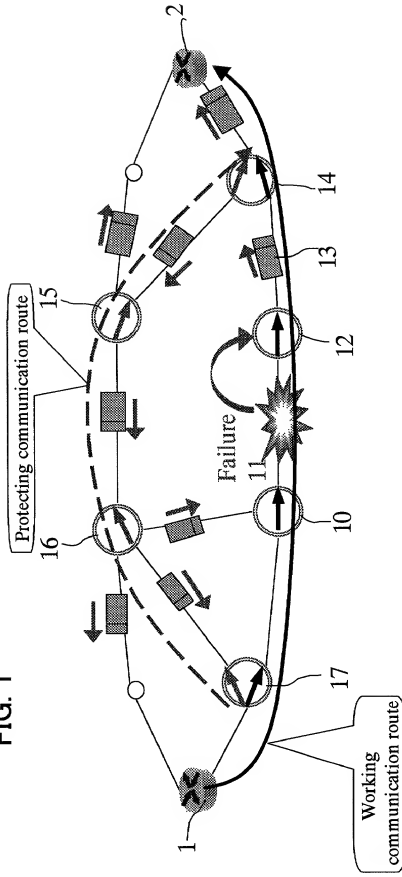


FIG. 2

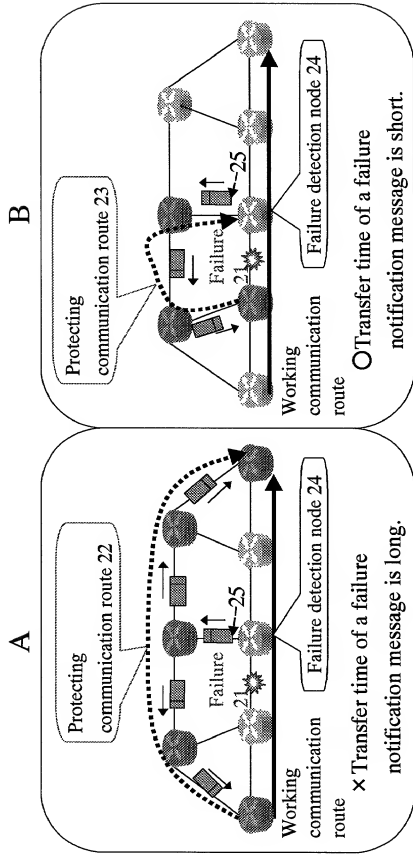


FIG. 3

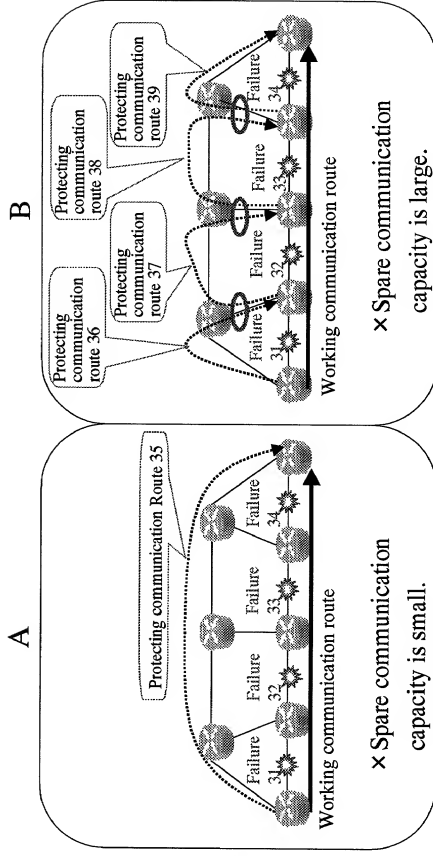
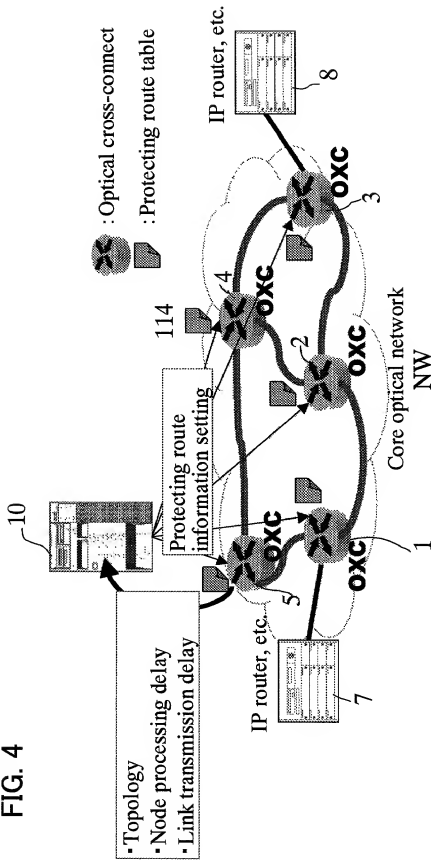


FIG. 4



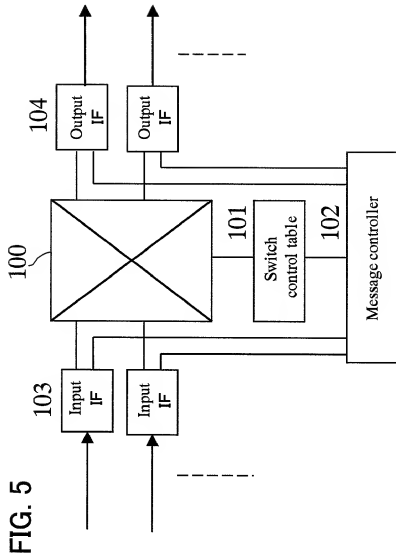


FIG. 6

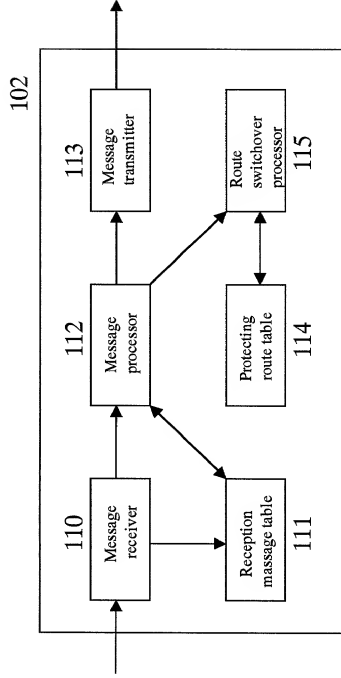


FIG. 7

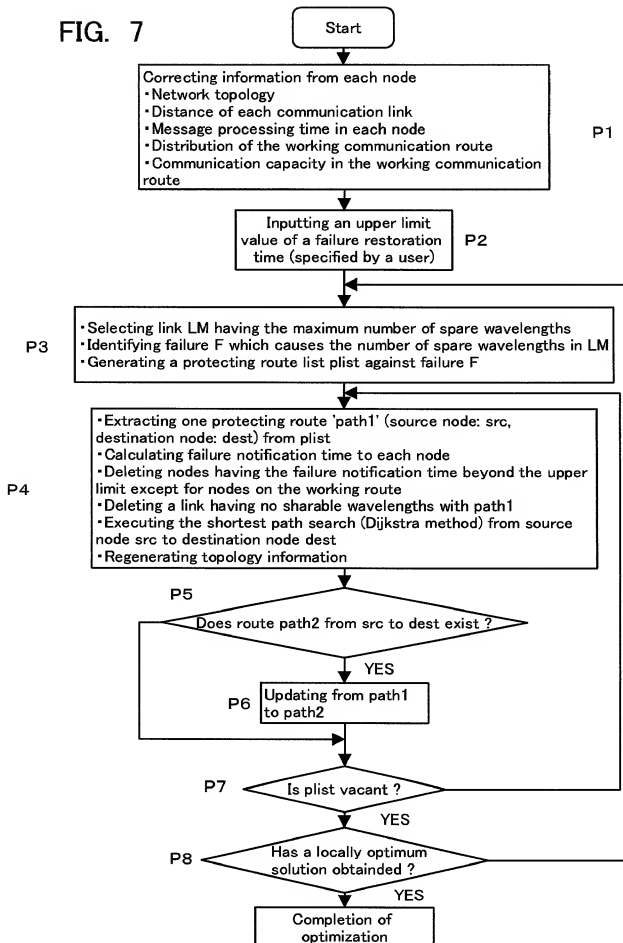


FIG. 8

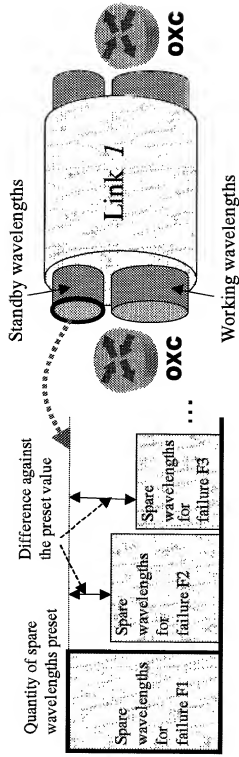




FIG. 9

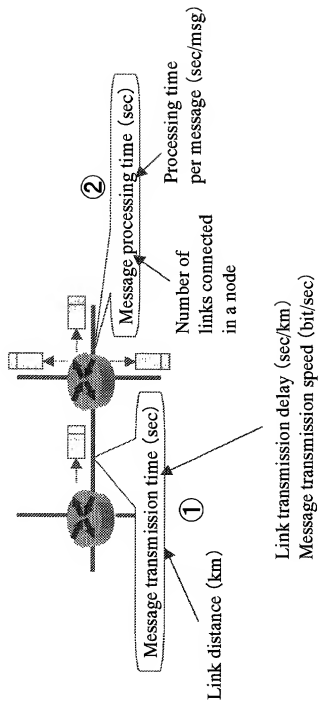


FIG. 10

Restoration time investigation table related to node 'N8'

Failure location 61	Failure detection node 62	Restoration time upper limit (ms) 63	Reception time of failure notification message (ms) 64	Route switchover time (ms) 65
Link L1 (N1,N4)	N1	50	8.75	41.25
	N4	50	4.50	45.50
Link L2 (N2,N5)	N2	50	3.25	46.75
	N5	50	10.0	40.00
Link L3	...	50	...	...

FIG. 11

66

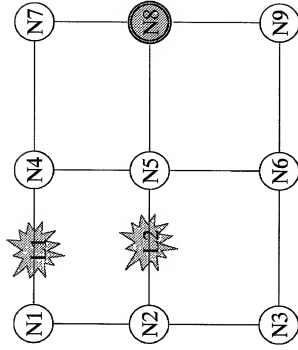




FIG. 13

Protecting communication route information table

Failure location 71	Damaged transmission node 72	Damaged reception node 73	Protecting communication route 74
Link L1 (N1,N4)	N1	N4	Path141
	N4	N1	Path411, Path412
	N1	N7	Path171
	N2	N4	Path241, Path242,
	...	...	...
Link L2 (N2,N5)	N2	N5	Path251
	N5	N2	Path521, Path522
	...	...	...
Link L3 ...	...	...	...

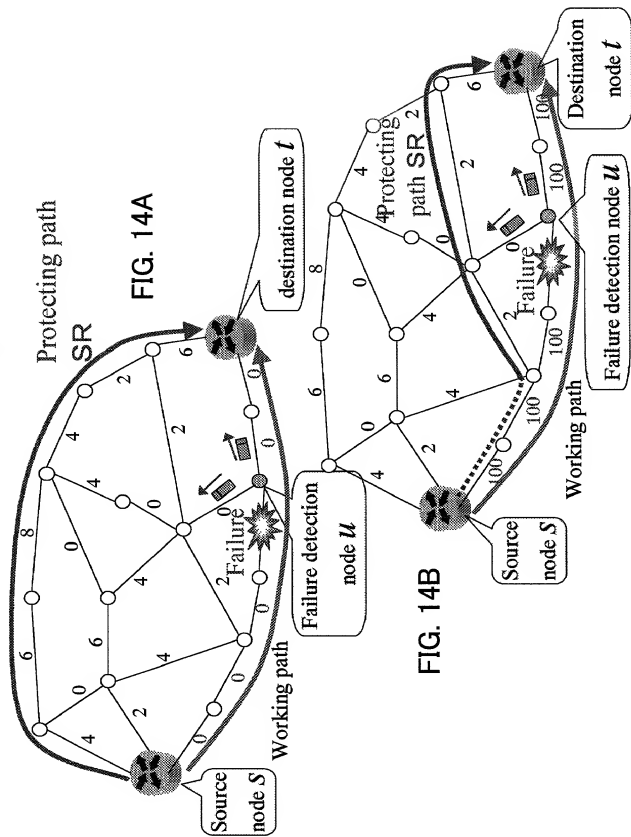


FIG. 15

Network scale	North America	Path length approx. 3000km
	Metropolitan area	Path length approx. 30km
Switchover system	Optical	Approx. 5.0e-3 sec
	Electric	Approx. 5.0e-9 sec
Message processing capability in a node (CPU capability)	'98	Approx. 1.0e-3 sec
	'01	Approx. 1.0e-4 sec

※Optical communication delay of 4.833e-6 sec/km is constantly fixed.

Fig. 16

	Network scale	
	North America (large)	Metropolitan area (small)
Switchover system	Optical	Communication delay neglected
	Electric	Switchover time neglected



FIG. 17

